REMARKS

INTRODUCTION

In accordance with the foregoing, claims 4, 5, 7-9, 11 and 12 have been amended. Claims 1-3 and 6 have been cancelled. Claims 13-15 have been added. Claims 4, 5 and 7-15 are pending and under consideration. Reconsideration is respectfully requested.

CLAIM REJECTIONS -- 35 U.S.C. § 102(b)

Claims 1-12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hanson et al. (US 5,201,185) (hereinafter "Hanson") in view of Denvir (US 6,851,270) (hereinafter "Denvir"). This rejection is traversed and reconsideration is requested.

Hanson discloses methods of defrosting an evaporator coil of a transport refrigeration unit. In Hanson, once step 380 finds that ADIT (automatic defrost interval timer) exceeds DTL (defrost time limit), then program 300 advances to step 382 which checks the CSFF (coil sensor fail flag) to determine if the evaporator coil temperature sensor 108 is functional. If step 382 finds flag CSFF set, indicating sensor 108 is faulty, step 384 compares the selected set point temperature SP with a predetermined temperature value which is well above freezing, such as 50 degrees F. If step 384 finds that the set point is not above the predetermined value, which is 50 degrees F. in the example, then step 386 arbitrarily sets the coil temperature as being below a predetermined value, such as 45 degrees F., and step 386 also requests the time defrost operation by setting the time defrost flag TDF true. Hanson, 10:35-10:49.

In Hanson, if unit 20 is controlling load space 90 to a set point above 50 degrees, then evaporator coil 62 should not require defrosting and step 384 goes to step 388 which resets timer ADIT to zero, and step 388 also sets the timed defrost flag TDF low or not-true, to prevent a time defrost operation from running. Program 300 then exits at 396. Hanson, 10:50-10:56.

In Hanson, when step 386 set flag TDF true, to request a time defrost operation, this was done with the knowledge that the coil temperature sensor 108 is faulty. Thus, program 300 continues from step 386 to steps 390, 392 and 394, which determine how the time initiated defrost operation should be terminated, since the temperature of evaporator coil 62 cannot be used to terminate defrost. This feature is implemented by step 390 first determining if the discharge air temperature sensor 104 is functional or faulty. The same program which checked coil sensor 108 sets a discharge air sensor fail flag DASFF true when discharge air temperature

sensor 104 is not found to be accurate, and step 390 thus checks this flag. If flag DASFF is not true, sensor 104 is functional, and step 392 sets defrost to terminate when the discharge air temperature reaches a predetermined value, such as 90 degrees F., and the program exits at 396. If step 390 finds flag DASFF true, i.e., sensor 104 is faulty, then step 394 sets the time initiated defrost operation to terminate after the defrost operation has continued for a predetermined time interval. All defrost operations are backed up with a defrost duration timer DDT, which terminates defrost when a predetermined time limit is reached, and step 394 may leave the DDT time limit unchanged, or it may change it, as desired. Step 394 then exits at 396. Hanson, 10:57-11:15.

Further in Hanson, when step 382 finds the evaporator coil temperature sensor 108 functional, step 398 checks the temperature of evaporator coil 62 and compares it with a predetermined value, such as 45 degrees F. If the coil temperature is not less than this predetermined value, step 400 determines if compressor 26 is running. If compressor 26 is running, program 300, each time it is run, will do nothing further until finding either that the temperature of the evaporator coil 62 is less than the predetermined value, e.g., 45 degrees F., or compressor 26 is not running. Step 402 determines which of these two events occurred by checking to determine if compressor 26 is running. If compressor 26 is running, it indicates that the program arrived at this point because the temperature of the evaporator coil 62 is below 45 degrees F., and program 300 will now "approve" the time defrost request initiated by the "yes" branch of step 380, by advancing to step 406 which sets the time defrost flag true, and the program exits at 396. Hanson, 11:16-11:35.

Denvir discusses an integrated refrigeration control system 10 that includes a compressor 12 having a start winding 12a and run winding 12b with an optional run capacitor 12c across lines connected to s (start winding) and r (run winding). The compressor motor is controlled by a microprocessor U1 of control module IRC. The IRC module also controls a compressor fan 13 and evaporator fan 14 along with a defrost heater 18. Denvir, 2:52-2:60 and Figures 1 and 2.

Claims 1-7

Amended independent claim 4 recites: "...executing a second defrosting mode ~~is executed~~according to a second defrosting condition when it is determined that the heat exchanger temperature sensor is in the failure state; wherein the step of executing the second

defrosting mode comprises the steps of: comparing a temperature of a storage compartment, to be cooled in accordance with an operation of the heat exchanger, with a reference temperature;and if the temperature of the storage compartment is lower than the reference temperature, determining that a compressor and a storage compartment fan operate normally, and turning on a defrost heater adapted to defrost the heat exchanger for a predetermined time for a defrosting operation." In contrast to amended claim 4, neither Hanson nor Denvir discuss a second defrosting mode that is executed when the heat exchanger temperature sensor is in the failure state **and** the temperature of the storage compartment is not higher than the reference temperature. In Hanson, as shown in Figure 7 and described at column 10, line 45, step 386 arbitrarily sets the coil temperature as being below a predetermined value. Hanson does not discuss a second condition as is recited in claim 4. This deficiency in Hanson is not cured by Denvir, as Denvir does not discuss a second condition either.

Claims 1-3 and 6 have been cancelled. Claims 5 and 7 depend from claim 4 and recite features that patentably distinguish over Hanson and Denvir, taken alone or in combination. For example, amended claim 5 recites that if the temperature of the storage compartment is not lower than the reference temperature, determining that at least one of the compressor and the storage compartment fan operates abnormally, and preventing the defrost heater from being driven to prevent the defrosting operation from being executed.

Withdrawal of the foregoing rejections is respectfully requested.

Claims 8-10

Amended claim 8 recites: "...if the heat exchanger temperature sensor is in a failure state, comparing a temperature of a storage compartment, to be cooled in accordance with an operation of the heat exchanger, with a reference temperature; and if the temperature of the storage compartment is lower than the reference temperature, determining that a compressor and the storage compartment fan operate normally, and turning on a defrost heater adapted to defrost the heat exchanger for a predetermined time for a defrosting operation." In contrast to claim 8, neither Hanson nor Denvir discusses comparing a temperature of a storage compartment with a reference temperature. Hanson discusses comparing a set point to an evaporator coil temperature. This deficiency in Hanson is not cured by Denvir as the thermal sensors S2 and S3 are positioned in a heat conductive relationship with the evaporator and the shell of the compressor, respectively, and not the storage compartment as is recited in claim 8.

Denvir, 2:62-2:65. Further, neither Hanson nor Denvir discuss a defrosting mode that is executed when the heat exchanger temperature sensor is in the failure state **and** the temperature of the storage compartment is not higher than the reference temperature.

Claims 9 and 10 depend from claim 8 and recite features that patentably distinguish over Hanson or Denvir, taken alone or in combination. For example, claim 10 recites that the failure state of the heat exchanger temperature sensor corresponds to an open-circuited or short-circuited state.

Withdrawal of the foregoing rejection is requested.

Claims 11 and 12

Claim 11 recites: "...a control unit adapted to execute a first defrosting mode for a defrosting time determined in accordance with a detection value of the heat exchanger temperature sensor when the heat exchanger temperature sensor is in a normal state, while executing a second defrosting mode for a defrosting time limited to a predetermined time, ~~which uses a defrosting completion condition and a defrosting execution determination condition different from those of the first defrosting mode,~~ when the heat exchanger temperature sensor is in a failure state." Similar to the arguments stated above regarding claims 4 and 8, neither Hanson nor Denvir discuss a defrosting mode that is executed when the heat exchanger temperature sensor is in the failure state **and** the temperature of the storage compartment in accordance with with a detection value of the heat exchanger.

Claim 12 depends from claim 11 and recites features that patentably distinguish over Hanson or Denvir, taken alone or in combination. For example, claim 12 recites that the first defrosting mode is executed to drive the defrost heater until the temperature measured by the heat exchanger temperature sensor reaches a first reference temperature.

Withdrawal of the foregoing rejection is respectfully requested.

NEW CLAIMS

New claims 13-15 have been added to present an alternate recitation of the present invention. No new matter has been added.

CONCLUSION

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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